

-19-

CLAIMS

1. An auxetic polymeric material in which the material is of the form of filaments or fibres.
2. A method of forming an auxetic material comprising cohering and extruding heated thermoformable particulate polymeric material, wherein cohesion and extrusion is effected during spinning to produce filamentary material having auxetic properties.
3. A method according to claim 2 which is performed substantially without any compaction or sintering stages separate to the extrusion with spinning process.
4. A method according to claim 2 or 3 which is performed substantially without any separate post-extrusion draw stage.
5. A method according to any one of claims 1 to 4 which is performed at a temperature which is high enough to give rise to cohesion of polymer particles sufficient to permit production of filaments, but without causing actual melting and complete coalescence of the particles into a liquid form.
6. A method according to any one of claims 1 to 5 which is performed with rough surfaced particles of irregular shape and size.
7. A method according to claim 6 wherein the particles are up to 300 μ m diameter.
8. A method according to any one of claims 1 to 7 performed using melt

36. The method according to claim 33 wherein said method is performed at a temperature which is high enough to give rise to cohesion of polymer particles sufficient to permit production of filaments but without causing actual melting and complete coalescence of the particles into a liquid form.
37. The method according to claim 33 wherein said particulate polymer material comprises rough surfaced particles having irregular shape and size.
38. The method according to claim 37 wherein said particles are up to 300 μ m in diameter.
39. The method according to claim 33 wherein said step of extruding is performed using melt extrusion apparatus having a barrel zone, an adapter zone and a die zone with an extruder plate, wherein said zones are capable of independent temperature control.
40. The method according to claim 39 wherein said barrel zone comprises a feed sub-zone, a compression sub-zone and a melting sub-zone, each of said sub-zones beign capable of independent temperature control.
41. The method according to claim 39 wherein said barrel zone includes an extrusion screw.
42. The method of claim 39 wherein said extruded filaments from said die zone are passed around rollers substantially without drawing traction.
43. An auxetic polymeric material of filamentary or fibrous form produced by a method comprising the steps of cohering and extruding a heated thermoformable particulate polymer material wherein cohesion and extrusion are effected during spinning to produce filamentary material having auxetic properties.

44. The auxetic polymeric material of claim 43 wherein said polymeric material comprises polypropylene.
45. The auxetic polymeric material of claim 43 wherein said polymeric material is formed in the configuration of a fabric.
46. The auxetic polymer material of claim 43 wherein said polymeric material is formed in the configuration of reinforcing fibers for use in a fiber-reinforced composite material.
47. The auxetic polymeric material of claim 46 wherein said composite material comprises sound insulation for building walls.
48. The auxetic polymeric material of claim 46 wherein said composite material is formed in the configuration of a vehicle body part.
49. The auxetic polymeric material of claim 48 wherein said vehicle body part comprises a vehicle bumper.
50. The auxetic polymeric material of claim 43 wherein said polymeric material is formed in the configuration of a personal protective device.
51. The auxetic polymeric material of claim 50 wherein said personal protective device comprises a crash helmet.
52. The auxetic polymeric material of claim 50 wherein said personal protective device comprises a projectile resistant article of clothing.
53. The auxetic polymeric material of claim 50 wherein said personal protective device comprises a shin pad.

54. The auxetic polymeric material of claim 50 wherein said personal protective device comprises a knee pad.
55. The auxetic polymeric material of claim 50 wherein said personal protective device comprises a glove.
56. The auxetic polymeric material of claim 43 wherein said polymeric material is formed in the configuration of a filter.
57. The auxetic polymeric material of claim 43 wherein said polymeric material is formed in the configuration of a twisted fiber rope.
58. The auxetic polymeric material of claim 57 wherein said twisted fiber ropes are configured in the form of a net.
59. The auxetic polymeric material of claim 43 wherein said polymeric material is formed in the configuration of a biomaterial.
60. The auxetic polymeric material of claim 43 wherein said polymeric material is formed in the configuration of a bandage or pressure dressing.
61. The auxetic polymeric material of claim 43 wherein said polymeric material is formed in the configuration of a seal or gasket.
62. The auxetic polymeric material of claim 43 further comprising an entrapped, releasable substance in the pores thereof.